My hackNY Application!

John Philip Follow
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The hackNY class of 2019 flexes in their amazing hoodies :)

I am incredibly lucky and happy to have been a hackNY Fellow during the summer of 2019! When I was applying, some of the most helpful material I reviewed were past alumNY applications. Reading other peoples' answers inspired me and got me thinking creatively about what aspects of my application I wanted to highlight. Applications for the 2020 class of hackNY Fellows are now open, and I want to help anyone applying right now by posting my final application here on Medium! If you're

Basics

Name

John Philip

School

Northeastern University

Major

Computer Science and Mathematics

Gender

Male

Graduation Date

2021

Internet Presence

GitHub

https://github.com/johnphilip283

Twitter

https://twitter.com/johnphilip283

LinkedIn

https://www.linkedin.com/in/john-philip/

Personal Website

https://johnphilip283.github.io/website/

Code sample

Paste in a ~100 line sample of code you're proud of.

```python
import tensorflow as tf
import numpy as np
from skimage import transform
import matplotlib.pyplot as plt
from tensorflow.examples.tutorials.mnist import input_data
```

```
 8     # Corrupt the data with random noise.
 9     data += tf.random_normal(tf.shape(data))
10
11     conv1 = tf.layers.conv2d(data, 32, 4, 2, activation=tf.nn.relu, padding="SAME")
12     conv2 = tf.layers.conv2d(conv1, 16, 4, 2, activation=tf.nn.relu, padding="SAME")
13     conv3 = tf.layers.conv2d(conv2, 8, 4, 2, activation=tf.nn.relu, padding="SAME")
14
15     # 32 x 32 x 1 -> 16 x 16 x 32
16     # 16 x 16 x 32-> 8 x 8 x 16
17     # 8 x 8 x 16 -> 4 x 4 x 8
18
19     # Take the 32 x 32 x 1 images and map them to a 4 x 4 x 8 latent compressed space,
20     # and then map them back out to 32 x 32 x 1 feature space.
21
22     conv4 = tf.layers.conv2d_transpose(conv3, 16, 4, 2, activation=tf.nn.relu, padding="SA
23     conv5 = tf.layers.conv2d_transpose(conv4, 32, 4, 2, activation=tf.nn.relu, padding="SA
24     final = tf.layers.conv2d_transpose(conv5, 1, 4, 2, activation=tf.nn.relu, padding="SAM
25
26     return final
27 def resize_images(images):
28
29     # Just it case it isn't in this form yet, reshape the tensor.
30     images = images.reshape((-1, 28, 28, 1))
31
32     # Initialize a tensor full of zeroes to hold the correct resized tensor
33     resized_images = np.zeros((images.shape[0], 32, 32, 1))
34
35     # For each image in the batch we have,
36     for i in range(images.shape[0]):
37
38       # find the correct slot in the resultant batch, and store the resized image there.
39       resized_images[i, ..., 0] = transform.resize(images[i, ..., 0], (32, 32))
40
41     return resized_images
42 inputs = tf.placeholder(tf.float32, shape=(None, 32, 32, 1))
43 rec_images = reconstruct(inputs)
44 # Let the loss functions just be a simple reconstruction loss.
45 loss = tf.reduce_mean(tf.square(rec_images - inputs))
46 train_op = tf.train.GradientDescentOptimizer(0.3).minimize(loss)
47 mnist = input_data.read_data_sets("MNIST_data", one_hot=True)
48 batch_size = 300
49 epochs = 10
50 num_batches = mnist.train.num_examples // batch_size
51 with tf.Session() as sess:
52
53     # Initialize all TensorFlow variables in the current session's graph.
```

```
56          for epoch in range(epochs):
57            for batch in range(num_batches):
58
59                images, _ = mnist.train.next_batch(batch_size)
60                images = images.reshape((-1, 28, 28, 1))
61                images = resize_images(images)
62
63                # Run the training step
64                _, num_loss = sess.run([train_op, loss], feed_dict={inputs: images})
65
66                print('Epoch: {} - cost= {:.5f}'.format((epoch + 1), num_loss))
67
68                # Display the reconstructed images and the loss from time to time.
69                if batch % 100 == 0:
70
71                  _, num_loss, re_images = sess.run([train_op, loss, rec_images], feed_dict={input
72
73                  plt.figure(1)
74                  plt.title('Reconstructed Images')
75                  for i in range(50):
76                    plt.subplot(5, 10, i+1)
77                    plt.imshow(re_images[i, ..., 0], cmap='gray')
78                  plt.figure(2)
79                  plt.title('Input Images')
80                  for i in range(50):
81                    plt.subplot(5, 10, i+1)
82                    plt.imshow(images[i, ..., 0], cmap='gray')
83                  plt.show()
84
85          images, _ = mnist.train.next_batch(1)
86          images = images.reshape((-1, 28, 28, 1))
87          images = resize_images(images)
88
89          image = sess.run([rec_images], feed_dict={inputs: images})[0]
90
91          plt.figure(1)
92          plt.title("Original image")
93          plt.imshow(images[0, ..., 0], cmap="gray")
94
95          plt.figure(2)
96          plt.title("Reconstructed image")
97          plt.imshow(image[0, ..., 0], cmap="gray")
98
99          plt.show()
```

mnist_denoising_autoencoder.py hosted with ❤ by GitHub   view raw

Tell us why you wrote this code and what it does.

I wrote this code in order to really test out my knowledge of neural networks. It's a denoising autoencoder, which is a fancy way of saying, a neural network that can remove random noise from objects and show them more clearly. The one written above denoises handwritten digits, from a popular dataset known as MNIST. I'm really proud of this code because I think I spent the better part of two months trying to understand a lot of the code and mathematics behind how these kinds of architectures behaved, and I learned a lot of transferable skills through this project.

On a broader note, I also wrote this code to help me understand and communicate how these black-box machine learning algorithms work. It proved to be a great tool under my belt to help explain how machine learning algorithms work to beginners in the field, and helps me emphasize why the problem of unexplainability exists in today's increasingly automated world. It's helped me show the students I teach the versatility of the field of machine learning, explaining how one simple structure can be used in fields like noise removal, more realistic animation effects, compression algorithms, etc., and gives them greater appreciation for the science.

Please provide links and descriptions of two of your own best coding projects, in any language.

Movie Recommender: I created a recommendation system for movies using the OMDB API, as well as the Wikipedia plot summary dataset, using the k-means clustering algorithm and a k-nearest neighbors lookup. This project was really useful in helping me understand how to write ETL pipelines, and understand the nuances of working with high-dimensional data.

MNIST Denoising Autoencoder: I created a neural network that was designed to reconstruct original images from their corrupted inputs. This project really taught me a lot about how neural networks actually work, how to build them, and how they internally represent the data they process.

Tell us about a time you built something awesome in code. How did you choose it? Why did you enjoy it?

intro CS classes. Because of this, I took on the challenge of learning about it independently. I learned a lot of material online, and had to learn a LOT of the math underpinning deep artificial neural networks, but at the end of it all, I was able to write some neural networks to classify handwritten digits. Going from knowing nothing about a field to being able to use the standard tools that experts use to build neural architectures was really daunting, but I feel like that was the part of the challenge that I truly enjoyed the most. Plus, deep learning is a field that marries mathematics and computer science rather beautifully, and being able to learn about two fields that I absolutely love was a rare and exciting opportunity that I couldn't bear to pass up.

Why is hackNY right for you?

I've always been someone who really enjoys and thrives in a highly social context. From my experience, personal projects are always better with a friend, and hacking is a hobby best suited for a community. That's why I think hackNY's highly collaborative spirit and tight-knit community devoted to using their skills for good are what really drew me to this program, and I feel as if I would thrive in such a community. Also, creating socially conscious programmers is something that I believe is really important in today's day and age, where information misuse and morally ambiguous policy reign. Exercising my ability to create benevolent software is the small part that I can play in order to combat this really important issue, and hackNY provides me with a perfect avenue by which I can achieve this.

I truly am excited about the work that I'd be doing in NYC, but honestly, I'm equally as excited to make new friends and have a great time. Going out and adventuring with my newfound hackNY community sounds like a blast to me, and knowing that I'll make friends that have core values in common with me is something I am seriously excited about. I like to bring people together and put smiles on people's faces, and you can guarantee that I'll be sure to bring a couple of laughs to the room. At the end of the day, I just hope that my presence just puts a net positive effect in the world, whether or not it comes through software engineering, or making the lives of the people around me better.

Tell us about what you hope to learn this summer.

that's always piqued my interest, and I don't want to pass up an opportunity to learn more skills to help me accomplish that. My experience with front-end/full-stack technologies like React, Node and SQL have been brief, but incredibly interesting, and I hope to hone the skills I have now into real assets I can use on a day-to-day basis. Joining the front-end development world is also a paradigm shift from the normal kinds of work I've usually done, so being exposed to best practices as well as common design/organizational patterns is something I'm really hoping to take away. From my time working on a full stack web application for pet sitters, I had to iterate quite a lot of times before figuring out the best way to organize my project, and seeing how a company does it firsthand would provide some really great insights for my future projects.

On a broader note, I'm really looking forward to learning how I can more actively invest my skills into projects for social good. Most of the positions that I've held at other companies were rather limited to the scope of the work I did, e.g) software development and data analytics, and sometimes I've felt frustrated with the say I have in the social impact my projects have. I'm hoping that with the collaboration of my hackNY community, I can learn how to more creatively lace social good with a viable product at the company that I end up working at.

Continuing from last year, in an initiative led by our AlumNY and reflecting their community values, all 2019 hackNY Fellows will participate in a project which promotes positive social impact, especially around increasing diversity and inclusivity in tech. Tell us about social good initiatives that you are excited about or problems you would like to see solved by social impact projects, why they are important to you, and what you would hope to accomplish with social good as a part of hackNY and beyond.

I consider myself to be incredibly privileged to have the world at my fingertips via the Internet. It's allowed my autodidactic nature to flourish and take off, with 90% of the skills I'm most proud of being a consequence of this privilege. However, it's incredibly easy to forget that thousands of children around the world have no such access, and it's a shame to think about how much potential we are wasting. A long-term social impact project that I would love to invest in is the creation of infrastructure to spread the Internet to places that do not yet have access to it. Following in the same vein, I've also been involved with other social impact projects,

that we could have learned so much more if we had started earlier. In response to this, we worked on Project Programming, a program dedicated to teaching students the fundamentals of computer science while still in elementary school. We created lesson plans, facilitated live workshops, and held interactive coding seminars for 3rd to 5th graders. My love for spreading CS education also followed with me to college, where I became a teaching assistant for two separate courses, with one of them being an introductory course on data science with over 300 students. Emphasizing important notions like ethics and adversarial thinking before students even began designing algorithms is something that I personally try to focus on while I teach. Teaching the world's data scientists the consequences of the work they do is incredibly important, and I believe it's an important area for an educator to focus on in order to let students really appreciate the scope of the work they do. I would like to continue with my work in facilitating social programs in education and I believe that the community that hackNY provides would give me some really nice tools to support me on this mission.

Is there a particular technology or industry you're currently interested in? How come? Where do you see it heading in the future?

As someone who's really interested in mathematics and computer science, I'm quite enthralled by the field of machine learning. I think the practical application of statistics and calculus in machine learning are what really made those subjects come alive for me, and seeing theoretical concepts get translated to real-life situations is just really satisfying to me. The future of the field is vast, but given today's use cases of machine learning, I think that an important part of the trajectory of machine learning surrounds decision making processes. A lot of companies have punted a lot of decisions to machine learning systems, but with consequences. Without keeping a human in the loop, automated decisions are currently quite unexplainable, given that they are the result of a black-box machine learning algorithm. Working on increasing explainability and interpretability of things like deep neural networks is vital to creating less biased systems. I've seen the field becoming a lot more active when it comes to this area of research in the last couple of years, and expect it to become even more popular in the coming years.

Discuss your technical skills/proficiencies/languages and experience

Python. I've also worked at Whoop, Inc., a sports training optimization startup, where I used Python, Pandas and Jupyter to perform preliminary research to changes in their calorie calculation algorithm. At Whoop, I also created a notification system used to notify users who were wearing the product incorrectly, by using their time-series heart rate and accelerometer data. My friend and I also created Petcetera, a website dedicated to helping find pet owners sitters for more unconventional pets. We set up the database using Microsoft MySQL Workbench, created a server using Node.js and Express, and built out the front end in React. The work that I've done in machine learning has been mostly self-taught, via a lot of lectures from popular Stanford and UC Berkeley classes, documentation crawling, and a lot of textbook reading. I develop things like convolutional neural networks and denoising autoencoders in Python, TensorFlow, and Jupyter notebooks, with occasional forays into PyTorch. Some friends and I also built a cross- platform mobile app in React Native in order to view what items are on sale at Trash2Treasure, a garage-sale type event held at Northeastern every year. This January, I will also be working at Wayfair, Inc. working on their financial engineering team, working on creating full-stack applications to aid in their reports to the SEC, using PHP, Python, SQL, Kafka, and React.js.

When you're not coding, what do you like to do?

When I'm not coding, I'm usually working as a member of the executive board of Northeastern University's chapter of the Association for Computing Machinery, working on bringing engineers from top companies to Northeastern to educate them on how they solve complex problems at a huge scale. I really enjoy being able to empower the casual student with knowledge that powers huge companies, because it's something we've always heard of, but seeing it firsthand is rather inspiring for the future CS graduate. I also tutor students in mathematics and computer science privately, helping them become the best students they can become. I also am a Peer Mentor for Northeastern's College of Computer and Information Science, meaning I'm paired up with incoming CS freshman and help them adjust to the curriculum, as well as their social life at Northeastern.

I also absolutely love cooking, going to concerts, going on trips with friends, and going to restaurants with my friends. We watch a lot of cooking YouTube channels, like Binging with Babish and Bon Appetit, and do our best recreations of the dishes

sticks, a question that's probably been annoying us since freshman year in college. Admittedly I still am on the Fortnite train and I love playing the game to blow off stress after classes. When I'm not in front of a screen, I really love reading, mostly about math and machine learning, but I'll read the occasional memoir or non-fiction. I am also quite the avid user of Twitter, where you can probably find me obsessing over Ariana Grande's discography or professing my love for the Cheesecake Factory.

What technologies/skills are you proficient in and enjoy working with?

Python, Java, SQL

What technologies/skills are you familiar with and and would be open to working with?

Machine Learning, React, React Native, Swift, PHP, iOS development, Android development, SQL

What sectors would you especially like to work in? (e.g., fashion, data science, media, art, education…)

Education, media, journalism, software development (preferably front-end or full-stack).

What sectors would you prefer not to work in?

Business, blockchain, finance

List five NYC startups you'd love to work at. If you're accepted, we'll do our best to match you with one of your favorites. If they're unavailable, we'll use this list to help make a great startup match for you.

BuzzFeed, Two Bulls, Codecademy, Jigsaw, Venmo

What size startup would you like to work with (total number of employees)?

51–100, 101–200, 201–500, 500+
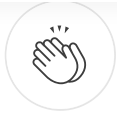
101 claps

WRITTEN BY

John Philip

live, laugh, love XD

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